

## Staying Ahead of the Digital Technological Curve Using Survey Methods

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## Staying Ahead of the Digital Technological Curve Using Survey Methods

### Authors

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Every day, Canadians receive multiple requests to participate in opinion surveys evaluating many interactions or experiences they have in their daily lives. Unfortunately, the ubiquitous prevalence of surveys has fostered a perception that surveys are an easy-to-implement and easy-to-use method of collecting information; in reality, this methodology requires significant consideration and planning (Couper, 2013, 2017; Dillman, 2016; Miller, 2017). At the beginning of the 20th century, the survey emerged as an in-person data collection tool used by government or health agencies for research. Today, the average individual is inundated with surveys to complete online, by text, through email, and via social media platforms such as Facebook, Instagram, Twitter, or other avenues of digital communication, to share their opinions regarding a product, a consumer experience, advertisements, political issues, current events, and more (Couper, 2017; Groves, 2011). It is not surprising that researchers find it more and more challenging to attain adequate survey responses from participants who feel burdened by being over-surveyed.

Surveys can be defined as non-experimental research in which a sample of a population is questioned about their thoughts, opinions, or actions as a representative of the larger population (Greenlaw & Brown-Welty, 2009; Patten & Newhart, 2018; Polit et al., 2001). Differentiated from the pragmatics of survey construction, survey design research is the systematic and intentional method of using surveys to gather data about a predetermined question to create and disseminate knowledge. An exploration of survey methodology reveals that considerable knowledge and effort is required to develop and administer a survey to obtain reliable and valid data. For novice researchers or students, this fact may be surprising because of the widespread presence of surveys in society. Furthermore, the rapid progression of digital technology continues to transform how surveys can be administered, reducing some previous challenges associated with this methodology while simultaneously creating a new set of opportunities and issues to consider. The purpose of this paper is to provide an overview of potential threats to survey research methods related to the advancement of digital technology, which is critical for those interested in using solid survey methodology.

## **Background**

Rapid digital development in the 21st century has spurred the transformation of surveys from their humble origins in the 1930s to the more robust research method evident today, and this transformation is challenging researchers to continually adapt this methodology to keep abreast of digital advancement (Groves, 2011). Initially, surveys were conducted in-person within a geographically based area and yielded high response rates despite small sample sizes (Dillman et al., 2014; Groves, 2011; Groves et al., 2009). Now, researchers are increasingly being challenged to adapt to new digital technologies that have impacted the delivery and use of surveys as an effective research methodology and method for data collection. Over time, the advent of the computer, Internet, and social media platforms, and the evolution from landlines to mobile phones, have contributed to an evolved survey landscape creating new challenges such as declining response rates, rising costs, and increasing privacy and confidentiality concerns, as well as emerging opportunities including new modes of data collection (e.g., SMS text, mobile) and the use of big data (Couper, 2013, 2017; Dillman et al., 2014; Groves, 2011; Groves et al., 2009; Moy & Murphy, 2016).

Surveys offer many advantages as a research method, including data collection by using a randomly selected sample that can be used to generalize or make inferences about a much larger population; lower cost in comparison to other data collection methods such as interviews or focus

groups; fewer barriers from geographic locations; the need for little training for administrators; enhanced possibilities of new multimedia usage through digital advancement (e.g., SMS text, mobile via smart phones); easier access to previously difficult-to-reach populations; and fewer manual entry and numerical errors because of automated data entry and analysis (Couper, 2000; Couper & Miller, 2008; Greenlaw & Brown-Welty, 2009; Hunter, 2012; Jones et al., 2008; Miller, 2017). Despite these advantages, researchers should also be cognizant of the impact the digital evolution may have on the generalizability, reliability, and validity of survey studies. Traditionally, mitigating issues of sampling error, coverage error, measurement error, and nonresponse error to augment survey design have been emphasized (Couper, 2000; Dillman et al., 2014; Hunter, 2012). Measurement error occurs when the participant does not respond to an item the way it was intended or misinterprets what it is asking, whereas nonresponse errors take place when participants do not respond to the survey or to specific items within the survey (Boyle et al., 2016; Dillman et al., 2014; Moy & Murphy, 2016). Coverage error refers to participants missing from or who are erroneously added to the frame, and sampling error may arise during the process of selecting a sample from the targeted population (Dillman et al., 2014; Hunter, 2012; Moy & Murphy, 2016).

These major errors and their impact on survey design should be re-examined given the influence of new digital technologies to emphasize the strengths of survey design while also understanding the weaknesses of this approach. Increased concerns about privacy and confidentiality, changes in legislation regarding data ownership, the increased need for bandwidth because of improved esthetics and graphics, and the potential for gamified survey design are but a few of the factors impacting survey design that require further examination as a result of digital technology progression (Couper, 2017; Dillman, 2016; Keusch & Zhang, 2017; Miller, 2017; Robinson et al., 2015). Note that this list of impacts is not exhaustive; several other threats exist such as processing error, the increasing use of bots, adjustment error, other issues of validity, and more (Couper, 2017; Dillman et al., 2014; Groves et al., 2009). Readers are encouraged to explore these additional threats to fully understand the impact on survey data collection and results. The following discussion examines several areas of concern that have arisen or have been augmented through the evolution of digital technologies including trust, confidentiality, and privacy issues; the impact of the digital divide on sampling and response quality; satisficing and survey fatigue; and technical concerns and design issues. “Traditional” threats such as coverage error, measurement error, sampling error, and nonresponse error are discussed within the context of these digitally related issues, and strategies to mitigate these areas of concern are also examined. Aspects of each of these areas may overlap and are enmeshed with one another because of the intertwined nature of digital innovation. We again caution that this list is not exhaustive and recommend that readers examine other factors specific to their own research.

### **Trust, Confidentiality, and Privacy**

Trust is a key element in survey response (Couper, 2017; Dillman, 2016; Jones et al., 2008). Trust pertains to the belief or the sense of security that respondents have about the origin, purpose, or legitimate nature of a survey and can be impacted by how confidentiality and privacy are attended to by the researcher. Although concerns regarding confidentiality are present in all survey types, the security of Web surveys is increasingly questioned by participants, specific to the privacy and confidentiality of their identity and responses, thereby potentially decreasing response rates and increasing the occurrence of insincere answers (Couper, 2000, 2017; Dillman, 2016; Tourangeau, 2018). An advantage of Web survey methodology has been its ability to gather information anonymously; it is especially useful for data collection, which can be impacted by

social desirability bias, and in lieu of interviewer-led surveys when collecting sensitive data, which participants may be otherwise reluctant to share, such as information related to HIV status, domestic abuse, or sexual practices (Hunter, 2012; Moy & Murphy, 2016). However, increasingly, individuals now fear the loss of identity through the use of digital cookies; the tracking of IP addresses, which is used by researchers to limit duplicate responses; and other means of tracking electronic footprints left behind from every digital interaction (Couper, 2013, 2017; Hammer, 2017; Hunter, 2012). Even when researchers stipulate within consent forms or instructions that survey software does not track IP addresses and that researchers have no means of identifying participants, participants remain distrustful, fearful that they will not remain anonymous or that their responses will not remain confidential. This behaviour has contributed to declining response rates over time (DeLeeuw, 2018).

How data are collected and saved is also a source of increasing distrust. In recent years, there has been an increased awareness of how the US Patriot Act impacts data collection in Canada and concerns regarding privacy. Because of this Act, researchers using US data collection tools or software must allow the collected data to be stored on a US-based server, subject to US law (Banks, 2012). This has caused considerable concern among Canadian researchers regarding the safeguarding of their participants' privacy and confidentiality of information. The amalgamation of Fluid Surveys with Survey Monkey, which uses a US-based server, highlighted a critical need for a Canadian-based survey software platform (Fluid Surveys, 2017). Canadian researchers can now use software such as Qualtrics (2020) and REDCap (2020), which are locally owned and purchased by educational and research institutions in Canada, to collect data and avoid issues associated with the US Patriot Act since they use Canadian-located servers. Using credible survey software agencies, such as Qualtrics or REDCap, offers less risk related to data breaches by having control of data specific to Canadian laws and specifications. These survey platforms also offer more choice in questionnaire administration where participant information can be confidential, anonymous, or both.

To alleviate fears of privacy or confidentiality violations, researchers should reassure participants by providing them with as much information as possible regarding the method and reasons for the information being collected via surveys and how the responses are being protected; use visuals to increase connection to the subject of the survey; and use follow-up emails or other modes of communication (Dillman, 2016; Jones et al., 2008). Survey researchers should clearly outline their relationship with the participants (such as how involved the researchers will be in the questionnaire administration and data collection) and their relationship with the agency or institution for which they are collecting this information (if applicable). Also, it is important that researchers indicate that servers housing participant responses are located in Canada and are not aligned with the US Patriot Act. Researchers may also foster trust with participants through means such as including a picture or video in the email survey invitation to cultivate relational connection between the researcher and the participant (Jones et al., 2008).

Lack of trust can result in high rates of nonresponse, which may result in nonresponse bias. To mitigate this error, researchers are often encouraged to employ follow-up strategies such as interviews to reach out to nonresponders. However, DeLeeuw (2018) cautioned that interviews may unintentionally propagate a social desirability effect because of the nature of data collection, meaning that the absence of anonymity may skew the nonresponder's responses. Second, depending on the number of nonresponders or the expanse of the geographical area, it may not be realistic to follow up with nonresponders of a Web survey; therefore, researchers should focus on

reducing nonresponse at the start of survey administration by using multiple techniques to increase response rates. These may include sending mail, text, or phone notifications before sending the email invitation (DeLeeuw, 2018).

Ultimately, researchers must weigh the benefits and disadvantages of the type of survey methodology they want to deploy to best instill trust and assure confidentiality and privacy of individual participation and responses. Understanding the reason or reasons for nonresponse rates, and when possible, the true score for non-responders, can provide important insights into ways that the data may be biased as a result of nonresponse error. This impact of nonresponse error is amplified when there is a distinct difference between those who did participate and those who did not, and it is up to the researcher to determine the extent of this impact on the study (Dillman et al., 2014; Groves, 2006; Groves & Peytcheva, 2008). Issues of trust, confidentiality, and privacy have great potential to impact response rates for Web surveys; however, understanding why these concerns exist can aid novice researchers in taking steps to mitigate these concerns.

### **The Digital Divide**

Web surveys continue to be employed for the many reasons that made them useful to begin with: they are cost-effective, can be administered to vast geographical areas, support automated data entry and analysis, and limit social desirability bias (Couper, 2017; Groves, 2011; Miller, 2017). However, there is a significant concern that the demographics of participants with Internet access may reflect a higher socioeconomic status or advanced computer literacy in relation to the total population being sampled (Dillman et al., 2014; Hunter, 2012).

Demographic factors have continued to expand the digital divide regarding access, Web activity, and social networking site use (Couper, 2017; Haight et al., 2014; Robinson et al., 2015). Furthermore, while the Internet has been normalized across society and is considered an essential service in many countries, the lack of access because of a paucity of high-speed Internet services in rural areas and the variability of Web resource use has undermined the ability of some individuals to participate in Web surveys (Haight et al., 2014; Hunter, 2012). For some, access may not be a barrier, however, an inability to carry out Web tasks and activities (e.g. lack of digital literacy), may hinder connectivity or participation (Couper & Miller, 2008; Haight et al., 2014), which may then result in a sampling error and a sampling bias. Robinson et al. (2015) argue that two levels of digital disparity exist, the first being those gaps that prevent users from engaging in full participation in a society that is increasingly tech-dependent, and the second level comprising those who lack skills or access. Despite proliferation of digital technology through smartphones and other smart devices, disadvantaged people continue to lack basic skills and digital literacy to use and access technology to its fullest ability (Robinson et al., 2015). Differences in demographics related to age, race, ethnicity, and socioeconomic status influence Internet use and knowledge, thereby perpetuating social inequalities and further widening the gap (Couper, 2017; Robinson et al., 2015). For example, Africans comprise 14% of the world's population but only 3% of the world's total Internet users (Robinson et al., 2015); and in case of age-related differences, only one-third of people in the United States over the age of 75 use the Internet, versus over 85% of those ages 18 to 34 (Couper, 2017; Khare, 2016). While Internet access has globally improved, the difference between those who do have access versus those who do not now magnifies this divide even more significantly (DeLeeuw, 2018).

Surprisingly, there has been a growing return to the use of mail surveys in the United States. The US Postal Service compiles a frequently updated list of residential addresses that covers

approximately 98% of all the households in the United States, and this list is available for researcher use (Dillman, 2016). Known as address-based sampling (ABS), this has afforded researchers the opportunity to combine multi-modes of data collection such as “Web-push” studies, where participants are contacted via mail first (which provides context and assurance regarding the validity of the survey and researchers) and are then directed to respond via web link or email (Couper, 2017; Dillman, 2016). This mode has demonstrated some success in attaining higher rates of responses than Web surveys alone (Couper, 2017; Dillman, 2016). Still, sampling error is intrinsic to all types of survey design, no matter the mode of data collection (i.e., in person, mail, telephone, Web), and is inherent in any scenario when a researcher surveys a portion of the sampling frame versus the whole target population (Boyle et al., 2016; Dillman et al., 2014). When considering multi-mode data collections, surveyors should be cognizant of the demographic differences between populations (such as those with or without Internet access, or those who have landline phones versus mobile phone owners), as differences in opinions and beliefs between these populations related to politics, social views, behaviours, and other topics do exist (Couper, 2017; Dillman et al., 2014; Groves, 2011).

Sometimes, researchers employ strategies to decrease sampling error that are not always effective. One is assuming that a larger sample size will negate the potential for sampling error (Couper, 2000). Another ineffectual strategy is to use non-probability sample designs, which place a greater emphasis on the number of participants as opposed to the representativeness of the population as a whole. This strategy can compromise the generalizability of the survey results (Couper, 2000, 2017; Robinson et al., 2015). Luckily, other avenues of recruiting participants have evolved courtesy of digital technology advancement—this includes river sampling, the survey wall, or the open access survey (Couper, 2017). In river sampling, participants are diverted while browsing the Web and guided to complete a survey; in using a survey wall, users cannot access the content they seek until they complete a specific number of survey questions; and in the open access survey, links to the survey are posted or shared through various Web sources such as social media (Facebook, Twitter, Instagram, etc.), word of mouth, or list servers (Couper, 2017). Social media has been increasingly used in both recruitment and survey administration; however, inequity in social media use across populations produces unrepresentative samples—for example, social media accounts can be run by individuals or businesses, and not all social media platforms are used by everyone (e.g., Twitter was used by only 23% of adults on the Web in 2016) (Moy & Murphy, 2016). Furthermore, as these are all forms of convenience sampling, they are subject to issues of coverage error and representation, rendering the results ungeneralizable (Couper, 2017; Robinson et al., 2015).

For Web surveys, researchers should investigate whether those targeted as potential participants have a means to access the Web, such as at work or at a public institution (e.g., a computer at a public library) if personal access is not an option. Researchers can use multiple means of recruitment other than the Internet and computers to administer surveys, such as using postal mail or phone calls as an invitation to participate before the actual administration of the survey. This process may increase response rates and also raise awareness that other participation options exist, thereby reducing the ongoing digital divide (Couper, 2000, 2017; Dillman et al., 2014; Groves et al., 2009; Haight et al., 2014; Miller, 2017).

### **Satisficing and Survey Fatigue**

Satisficing is defined as the impact participants’ diminished energy has on how accurately they respond to survey items because of a loss of attention, distractions, or feelings of irritation or

annoyance (Downes-Le Guin et al., 2012; Keusch & Zhang, 2017). In the age of digital technology, the pervasive use of surveys has led to survey fatigue. Survey fatigue, or respondent burden, is defined as a phenomenon which occurs when participants are unmotivated to participate or become bored while completing a survey, which can lead to issues such as satisficing or straight-lining (when participants choose the same answer down a column of items) (Lavrakas, 2008; O'Reilly-Shah, 2017). Survey fatigue is amplified when the length of time, the effort required, the emotional or cognitive stress endured to complete, or the high frequency of participation is considered to be more than the value of participating in the survey (Lavrakas, 2008; Downes-Le Guin et al., 2012).

Participants may be willing to undergo greater burden if the data they provide are perceived to be valuable or if their experience is enjoyable. Despite digital technological advancement, both satisficing and survey fatigue remain an issue. The length of a survey, inclusion of all possible and appropriate responses, or the use of innovative survey techniques such as gamification should be considered to avoid satisficing (Downes-Le Guin et al., 2012; Keusch & Zhang, 2017; Lavrakas, 2008). For participants to respond to a survey question, they must engage in a cognitive process to answer it; hence, survey researchers should ensure that all questions use equivalent rating scales and that the available responses encompass all possible answers, thereby limiting the chance of a participant choosing a non-essential response (Ansolabehere & Schaffner, 2015; Lavrakas, 2008). However, it is important to be mindful that shorter surveys attain higher response rates (Couper, 2013). Additionally, researchers should also consider whether their target demographic has been previously overburdened and put mechanisms in place to limit the questions and number of surveys delivered to the population being invited to participate. For example, in an attempt to prevent coverage error, perhaps the participant has been targeted multiple times because of their demographics (e.g., individuals with rare disorders). Another area for consideration is the impact of distractions on participants' ability to complete a survey or how they respond to open-ended questions in a survey. Ansolabehere and Schaffner (2015) determined that participants were more distracted when questions increased in cognitive complexity, which could lead to increased rates of satisficing, thereby introducing measurement error into the results. Satisficing in Web surveys is a persistent challenge, and the incorporation of the latest in visual design and other strategies should be considered to minimize satisficing and improve conscientious reporting response (Ansolabehere & Schaffner, 2015; Downes-Le Guin et al., 2012; Keusch & Zhang, 2017; Lavrakas, 2008).

There are additional digital strategies that researchers may use to minimize satisficing and limit survey fatigue. Downes-Le Guin et al. (2012) determined that attentiveness to survey length, topic relevance, study design, and rate of survey requests were most effective for dealing with respondent burden. Multimedia options today can be used to develop an innovative survey experience to limit satisficing and survey fatigue. For example, gamification of surveys has been proposed as a potential strategy to increase engagement and motivation (Keusch & Zhang, 2017). Gamified surveys could lead to more uplifting survey experiences, making them fun and thereby increasing response rates (Keusch & Zhang, 2017). However, it is not without limitations and potential biases. Critics of gamified surveys point to the impact of gamified design on measurement error (how gamified questions are perceived), impacts on validity (if wording or layout is changed because of gamification), and the potential for a skewed positive bias related to the "fun" nature of gamified experiences, which may inhibit future application (Keusch & Zhang, 2017).



Surveys completed through texting are a valid option with many benefits. As an innovative means of survey administration, text surveys use current communication practices, allowing participants to respond at their convenience, as well as allowing for confidential responses resulting in quality data (Moy & Murphy, 2016). While more time is required to administer text surveys, they have been noted to attain higher response rates and participant satisfaction (Moy & Murphy, 2016). Providing various means of survey data collection via personal communication devices may augment response rates and the quality of data collected; in the future, data blended from various sources may be the norm (Miller, 2017).

### **Technical and Design Issues**

Technical concerns and design issues have been identified as contributing to all types of error including nonresponse, coverage, measurement, and sampling errors. Both survey access and survey administration are influenced by technical and design matters such as Internet access, respondent technical ability, visual design changes across devices, and more. On a positive note, digital advancement in esthetics, speed, abilities such as gamification or multimedia use, and the extent to which individuals can now shop, learn, or play games on the Web is remarkable. Unfortunately, every digital advancement comes with new threats to individual security, which foster distrust. For example, participants might have previously trusted clicking on links to be routed to another site but now need to be aware of phishing scams or that a link may contain a computer virus, malware, or ransomware (Dillman, 2016; Hunter, 2012; Williams & Polage, 2019). Phishing, or the act of sending fraudulent emails to large groups of people, has increased the distrust individuals have with receiving emails asking them to respond to a survey or click on a link from researchers they do not know (Dillman, 2016; Williams & Polage, 2019). People are more apt to trust emails when company logos or copyright statements are displayed (Williams & Polage, 2019). However, fraudulent individuals can easily produce authentic and sophisticated looking emails to entrap people. It is getting more difficult to differentiate between real and ill-intentioned emails, thereby decreasing the overall trust people have regarding survey requests. This distrust is further amplified by those potential participants for whom “technophobia” limits their familiarity with computers and the Internet, or who may be suspicious of its capabilities, thereby increasing their hesitation to respond to web questionnaires (Hunter, 2012).

In addition to design and technical concerns, inadequate Internet speeds, poor connections, or lack of sufficient broadband width may reduce a participant’s motivation and ability to complete a survey (Couper, 2000; Gelder et al., 2010; Robinson et al., 2015). These technical issues create obstacles for researchers in developing a survey with other multimedia formats such as advanced graphics or videos, or gamified surveys (Couper, 2000; Keusch & Zhang, 2017; Robinson et al., 2015). Researchers should be cognizant of the digital divide, its demographic disparities, and the impact on the quality of participant responses (Couper, 2000, 2017). It can be argued that while the availability of Internet access has increased for some, the disparity between those on opposite ends of the digital divide in terms of socioeconomic status, ethnic representation, health, and levels of computer literacy has widened (Couper, 2000; Couper, 2017; Hunter, 2012). To decrease these concerns, researchers should be cognizant of participant demographics and the digital burden that gamification elements, graphics, or videos may place on a participant’s ability to download or access material related to bandwidth issues (Hunter, 2012; Keusch & Zhang, 2017; Robinson et al., 2015). Researchers could also assure the validity of a link sent via email by contacting participants with introductory and reminder emails using the same format/design as the email with the questionnaire link in order to promote its validity (Couper, 2017; Gelder et al., 2010; Hunter,

2012). For example, the use of logos from research programs prominently placed on all recruitment and process-related emails or communications can increase identification of legitimate research materials and requests for participation.

The impact of poor survey design can be considerable for survey outcomes but is often magnified with the implementation of Web surveys. Web survey layout can be impacted by browser settings, user preferences, computer capability, and the channel of communication (audio versus visual, smartphone use, tablets, etc.), which can further impact the occurrence of nonresponse and measurement error (Couper, 2000, 2011; Moy & Murphy, 2016). Researchers must assume that when they are administering a Web survey, they are also administering a mobile survey, and therefore attention to visual design and functionality is needed (Moy & Murphy, 2016). Poor visual layout, organization, and survey length may promote satisficing, straight-lining, randomized responding, or speeding because of participants' feeling distracted, unmotivated, unengaged, or cognitively taxed, which ultimately impact the quality of responses received (Ansolabehere & Schaffner, 2015; Downes-Le Guin et al., 2012; Keusch & Zhang, 2017). Not only is the impact of question wording increasingly important, but aspects including question placement, overall flow, and text features also have significant influence on measurement and nonresponse errors (Couper, 2000; Dillman et al., 2014). The impact of wording, structure, grammar, or use of colloquial language will not only alter how a question is perceived but may also generate low construct validity that is impactful to measurement error (Couper, 2000; Dillman et al., 2014).

To decrease nonresponse and measurement error, a focus on study design should include reviewing survey questions to remove poorly constructed language or language bias (Dillman et al., 2014; Hardre et al., 2012). When using Web surveys, technical writing issues (i.e., spacing, item wording, question order, etc.) also need to be avoided so that they do not negatively impact participant response to survey items. Researchers should also attend to decreasing the chance for measurement error before administering Web surveys. Measurement error may occur through social desirability bias; low construct validity (also known as specification error, which occurs when the survey item does not measure what it was intended to measure); response bias; or response variance (DeLeeuw, 2018; Dillman et al., 2014; Moy & Murphy, 2016). Measurement error may occur when participants feel restricted or disinclined to select a response because of the wording or order of questions, or when respondents react negatively to the visual arrangement of survey items. Construction issues such as a lack of proper scales may also result in measurement issues, along with the presence of unclear questions or question structure, as well as data collection anomalies that skew responses (Couper, 2000; Dillman et al., 2014; Gelder et al., 2010; Krosnick, 2018; Rattray & Jones, 2007; Stern et al., 2007).

Both technical and design issues impact the overall quality of survey findings. The impact of Internet connectivity, survey administration, or the differences between responders and nonresponders are reflected within the responses collected and can erroneously lead to skewed interpretations of the results (Miller, 2017; Robinson et al., 2015). Best practice indicates that a survey question ought to be completed as quickly as possible and with the least amount of error possible (Krosnick, 2018). To ensure participants are able to complete a survey quickly and accurately, the researcher needs to ensure that constructs have been clearly conceptualized; that questions are clear, structured appropriately, and ordered logically; and that the visual layout of the survey is compatible across platforms and devices, all of which contribute to the quality and amount of data obtained (Dillman et al., 2014; Downes-Le Guin et al., 2012; Moy & Murphy,

2016). Visual layout of surveys is imperative as screen design impacts respondent engagement. More specifically, aspects such as image use, the number of questions per screen, progress indicators, and text colours impact response rates; ultimately, poor questionnaire design can lead to satisficing or nonresponses (Downes-Le Guin et al., 2012; Mahon-Haft & Dillman, 2010; Stern et al., 2007).

### **Contribution to the Quality Advancement of Nursing Education**

This manuscript is purposeful in providing novice researchers and nursing students interested in surveys with an introductory understanding of the impact, challenges, and benefits that digital technological advancement has had on the evolution of this methodology. The administration of surveys is no simple feat—it requires time, understanding, application, and critical awareness of the advantages and disadvantages that digital technology brings. As digital technology has become ubiquitous in society, the influence on survey administration should be a foundational knowledge provided to future researchers, students, and those interested in this methodology. Specific to nursing education, the information in this manuscript aides in advancing basic nursing knowledge regarding research methodologies so that future nursing scholars and researchers are best prepared to use survey methodology as proficiently as possible.

### **Conclusion**

As with any method, surveys are not without limitations, especially in light of digital technology advancement. Since their inception, surveys have gained significant momentum as a means by which researchers, organizations, agencies, and governments can learn about a specific populace. Simultaneously, several threats to surveys have emerged such as issues of trust, the impact of the digital divide, survey fatigue, and technical and design issues. Keen researchers seeking reliable and valid results must be cognizant of these limitations and seek opportunity to employ some of the strategies outlined in this paper to reduce these threats. While digital technology continues to transform surveys and the emerging possibilities improve survey design (e.g., rising broadband capability, digital media), it remains imperative that researchers stay alert to the challenges that digital technology brings.

## References

- Ansolabehere, S., & Schaffner, B. F. (2015). Distractions: The incidence and consequences of interruptions for survey respondents. *Journal of Survey Statistics and Methodology*, 3, 216–239. <https://doi.org/10.1093/jssam/smv003>
- Banks, T. (2012). *Canada: Cloud computing and the USA Patriot Act: Canadian implications—update*. Mondaq. <http://www.mondaq.com/canada/privacy-protection/191964/cloud-computing-and-the-usa-patriot-act-canadian-implications--update>
- Boyle, K. J., Morrison, M., MacDonald, D. H., Duncan, R., & Rose, J. (2016). Investigating Internet and mail implementation of stated-preference surveys while controlling for differences in sample frames. *Environmental Resource Economics*, 64, 401–419. <https://doi.org/10.1007/s10640-015-9876-2>
- Couper, M. P. (2000). Web surveys: A review of issues and approaches. *Public Opinion Quarterly*, 64(4), 464–494. <https://doi.org/10.1086/318641>
- Couper, M. P. (2011). The future of modes of data collection. *Public Opinion Quarterly*, 75(5), 889–908. <https://doi.org/10.1093/poq/nfr046>
- Couper, M. P. (2013). Is the sky falling? New technology, changing media, and the future of surveys. *Survey Research Methods*, 7(3), 145–156. <https://doi.org/10.18148/srm/2013.v7i3.5751>
- Couper, M. P. (2017). New developments in survey data collection. *Annual Reviews of Sociology*, 43, 121–145. <https://doi.org/10.1146/annurev-soc-060116-053613>
- Couper, M. P., & Miller, P. V. (2008). Web survey methods: Introduction. *Public Opinion Quarterly*, 72(5), 831–835. <https://doi.org/10.1093/poq/nfn066>
- DeLeeuw, E. (2018). Mixed-mode: Past, present and future. *Survey Research Methods*, 12(2), 75–89. <https://doi.org/10.18148/srm/2018.v12i2.7402>
- Dillman, D. A. (2016). Moving survey methodology forward in our rapidly changing world: A commentary. *Journal of Rural Social Sciences*, 31(3), 160–174. <https://egrove.olemiss.edu/jrss/vol31/iss3/8>
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail and mixed-mode surveys: The tailored design method* (4th ed.). John Wiley & Sons.
- Downes-Le Guin, T., Baker, R., Mechling, J., & Ruyle, E. (2012). Myths and realities of respondent engagement in web surveys. *International Journal of Market Research*, 54(5), 613–633.
- Fluid Surveys. (2017). *Canadian survey software*. <https://fluidsurveys.com/canada/survey-software-data-canada/>
- Gelder, M. H., Bretveld, R. W., & Roeleveld, N. (2010). Web-based questionnaires: The future in epidemiology. *American Journal of Epidemiology*, 172(11), 1292–1298. <https://doi.org/10.1093/aje/kwq291>
- Greenlaw, C., & Brown-Welty, S. (2009). A comparison of web-based and paper-based survey methods: Testing assumptions of survey mode and response cost. *Evaluation Review*, 33(5), 464–480.

- Groves, R. (2006). Nonresponse rates and nonresponse bias in household surveys. *Public Opinion Quarterly*, 70(5), 646–675. <https://doi.org/10.1093/poq/nfl033>
- Groves, R. (2011). Three eras of survey research. *Public Opinion Quarterly*, 75(5), 861–871. <https://doi.org/10.1093/poq/nfr057>
- Groves, R. M., Fowler, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2009). *Survey methodology* (2nd ed.). John Wiley & Sons.
- Groves, R., & Peytcheva, E. (2008). The impact of nonresponse rates on nonresponse bias: A meta-analysis. *Public Opinion Quarterly*, 72(2), 167–189. <https://doi.org/10.1093/poq/nfn011>
- Haight, M., Quan-Haase, A., & Corbett, B. A. (2014). Revisiting the digital divide in Canada: The impact of demographic factors on access to the internet, level of online activity, and social network usage. *Information, Communication & Society*, 17(4), 503–519. <https://doi.org/10.1080/1369118X.2014.891633>
- Hammer, M. J. (2017). Ethical considerations for data collection using surveys. *Oncology Nursing Forum*, 44(2), 157–159. <https://doi.org/10.1188/17.ONF.157-159>
- Hardre, P. L., Crowson, M., & Xie, K. (2012). Examining contexts-of-use for Web-based and paper-based questionnaires. *Educational & Psychological Measurement*, 72(6), 1015–1038. <https://doi.org/10.1177/0013164412451977>
- Hunter, L. (2012). Challenging the reported disadvantages of e-questionnaires addressing methodological issues of web data collection. *Nurse Researcher*, 20(1), 11–20. <https://doi.org/10.7748/nr2012.09.20.1.11.c9303>
- Jones, S., Murphy, F., Edwards, M., & James, J. (2008). Doing things differently: Advantages and disadvantages of web questionnaires. *Nurse Researcher*, 15(4), 15–23. <https://doi.org/10.7748/nr2008.07.15.4.15.c6658>
- Keusch, F., & Zhang, C. (2017). A review of issues in gamified surveys. *Social Science Computer Review*, 35(2), 147–166. <https://doi.org/10.1177/0894439315608451>
- Khare, M. (2016). *Estimated prevalence and characteristics of web users: National health interview survey, 2014–2015*. American Statistical Association. <http://www.asasrms.org/Proceedings/y2016/files/389540.pdf>
- Krosnick, J. A. (2018). Questionnaire design. In D. L. Vanette & J. A. Krosnick (Eds.), *The Palgrave handbook of survey research* (pp. 439–456). Springer International Publishing.
- Lavrakas, P. J. (Ed.). (2008). *Encyclopedia of SAGE survey research methods*. Sage Publications.
- Mahon-Haft, T. A., & Dillman, D. A. (2010). Does visual appeal matter? Effects of Web survey aesthetics on survey quality. *Survey Research Methods*, 4(1), 43–59. <https://doi.org/10.18148/srm/2010.v4i1.2264>
- Miller, P. V. (2017). Is there a future for surveys? *Public Opinion Quarterly*, 81, 205–212. <https://doi.org/10.1093/poq/nfx008>
- Moy, P., & Murphy, J. (2016). Problems and prospects in survey research. *Journalism & Mass Communication Quarterly*, 93(1), 16–37. <https://doi.org/10.1177/1077699016631108>

- O'Reilly-Shah, V. N. (2017). Factors influencing healthcare provider respondent fatigue answering a globally administered in-app survey. *PeerJ*, 5, e3785. <https://doi.org/10.7717/peerj.3785>
- Patten, M. L., & Newhart, M. (2018). *Understanding research methods: An overview of the essentials* (10th ed.). Taylor & Francis.
- Polit, D. F., Beck, C. T., & Hungler, B. P. (2001). *Essentials of nursing research: Methods, appraisal, and utilization* (5th ed.). Lippincott Williams & Wilkins.
- Qualtrics. (2020). *Online survey software*. <https://www.qualtrics.com>
- Rattray, J., & Jones, M. C. (2007). Essential elements of questionnaire design and development. *Journal of Clinical Nursing*, 16, 234–243. <https://doi.org/10.1111/j.1365-2702.2006.01573.x>
- REDCap. (2020). *Research electronic data capture*. <https://www.project-redcap.org>
- Robinson, L., Cotton, S. R., Ono, H., Quan-Haase, A., Mesch, G., Chen, W., Schulz, J., Hale, T. M., & Stern, M. J. (2015). Digital inequalities and why they matter. *Information, Communication & Society*, 18(5), 569–582. <https://doi.org/10.1080/1369118X.2015.1012532>
- Stern, M. J., Dillman, D. A., & Smyth, J. D. (2007). Visual design, order effects, and respondent characteristics in a self-administered survey. *Survey Research Methods*, 1(3), 121–138. <https://digitalcommons.unl.edu/sociologyfacpub/671>
- Tourangeau, R. (2018). Confidentiality, privacy, and anonymity. In D. L. Vanette & J. A. Krosnick (Eds.), *The Palgrave Handbook of Survey Research* (pp. 501–507). Springer International Publishing.
- Tourangeau, R., Conrad, F., & Couper, M. (2013). *The science of Web surveys*. Oxford University Press.
- Williams, E. J., & Polage, D. (2019). How persuasive is phishing email? The role of authentic design, influence and current events in email judgments. *Behaviour & Information Technology*, 38(2), 184–197. <https://doi.org/10.1080/0144929X.2018.1519599>